Physics Review
Answer Section

SHORT ANSWER

1. ANS:
The correct answers are:
a. 47.89
b. 1010
c. 0.003 973

REF: UC LOC: DS1f

2. ANS:
The answer from the subtraction will have the same number of decimal places as the measured value being subtracted with the fewest decimal places.

REF: UC LOC: DS1f

3. ANS:
The correct answers are:
a. infinite
b. 5
c. 2
d. 3

REF: UC LOC: DS1f

4. ANS:
$w = 15.2\text{ m}$

$l = 17.45\text{ m}$

$A = l \times w$

$= 17.45\text{ m} \times 15.2\text{ m}$

$= 265.24\text{ m}^2$

$= 265\text{ m}^2$, which is rounded to three significant digits

The area of the rectangular yard is 265 m^2.

REF: UC LOC: DS1f

5. ANS:
$$v = \frac{50\text{ km}}{\text{h}} \times \frac{1\text{ h}}{60\text{ min}} \times \frac{1\text{ min}}{60\text{ s}} \times \frac{1000\text{ m}}{1\text{ km}} = \frac{14\text{ m}}{\text{s}}$$

REF: UC LOC: DS1g

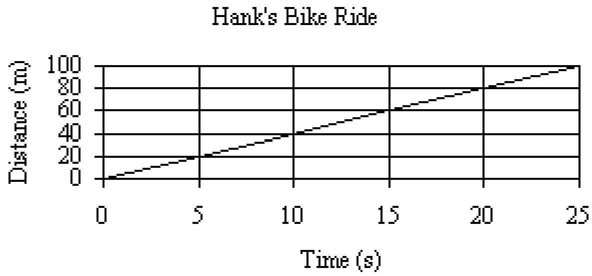
6. ANS:
Multiply by 3: 3V = Ah

Divide by h: $\frac{3\text{ V}}{\text{h}} = A$

Rewrite: $A = \frac{3\text{ V}}{\text{h}}$

REF: UC LOC: DS1g

7. ANS:
Using the evidence in the table, the following graph is obtained.



A best-fit line is drawn, the rise and run of the line are measured, and the slope is calculated.

$$\text{slope} = \frac{\text{rise}}{\text{run}} \quad v_{av} = \frac{\Delta d}{\Delta t} = \frac{(100-0)}{(25-0)}\,\text{m} = 4.0\,\text{m/s}$$

Hank's bike speed is 4.0 m/s.
The design involves 5 observers with stopwatches. A more efficient design to reduce error would be to use only one observer with a stopwatch at 100 m.

REF: AS LOC: UBC1, DS1e

8. ANS:

a. $v_{av} = \frac{40\text{ km}}{\text{h}} \times \frac{1\text{ h}}{60\text{ m}} \times \frac{1\text{ min}}{60\text{ s}} \times \frac{1000\text{ m}}{1\text{ km}} = \frac{11\text{ m}}{\text{s}}$

The speed of the Beetle is 11 m/s.

b. $v_{av} = 11\frac{\text{m}}{\text{s}}$

$\Delta t = 0.40\text{ s}$

$\Delta d = ?$

$\Delta d = v_{av}\Delta t$

$= 11\frac{\text{m}}{\text{s}} \times 0.40\text{ s}$

$= 4.4\text{ m}$

The car moved 4.4 m by the time she applied the brake.

REF: AS LOC: UBC1

9. ANS:

$v = 332\text{ m/s}$

$\Delta\text{t} = 0.500\text{ s}$

$\Delta\text{d} = ?$

$\Delta\text{d} = v\,\Delta\text{t}$

$= 332\text{ m/s} \times 0.500\text{ s}$

$= 166\text{ m}$

$166\text{ m} / 2 = 83.0\text{ m}$ (/2 because the sound travels to the wall and back in 0.500s)

The student is standing 83 m in front of the wall.

REF: AS LOC: UBC1, DS1c

10. ANS:

(a) $\Delta d = 35.0 \text{ km}$

$\Delta t = 169 \text{ min}$

$v_{av} = ?\text{ km/h}$

$$\Delta t = 169 \text{ min} \times \frac{1\text{h}}{60.0 \text{ min}} = 2.82\text{h}$$

$$v_{av} = \frac{\Delta d}{\Delta t}$$

$$= \frac{35.0 \text{ km}}{2.82 \text{ h}}$$

$= 12.4 \text{ km/h}$ (rounded to 3 significant digits)

The average speed of the aircraft was 12.4 km/h.

(b) $\Delta d = v_{av}\,\Delta t$

$= 12.4 \text{ km/h} \times 5.3 \text{ h}$

$= 66 \text{ km}$ (rounded to 2 significant digits)

Assuming he maintained the same average speed, then he would cover a total of 66 km.

REF: AS LOC: UBC4

11. ANS:

(a) $\Delta d = 28\,577.5 \text{ km} - 28\,456.0 \text{ km} = 121.5 \text{ km}$

$\Delta t = 1.35\text{h}$

$v_{av} = ?\text{ km/h}$

$$v_{av} = \frac{\Delta d}{\Delta t}$$

$$= \frac{121.5 \text{ km}}{1.35 \text{ h}}$$

$= 90.0 \text{ km/h}$ (3 significant digits)

The average speed of the car is 90.0 km/h.

(b) $$\Delta t = \frac{\Delta d}{v_{av}}$$

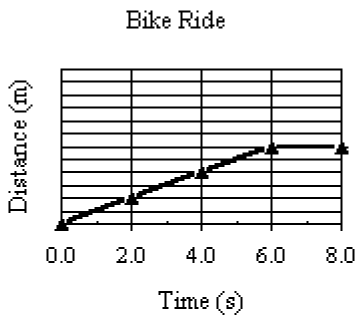
$$= \frac{170 \text{ km}}{90.0 \text{ km/h}}$$

$= 1.89 \text{ h}$ (rounded to 3 significant digits)

The family will make the trip from Oshawa to Niagara Falls in 1.89 hours.

REF: AS LOC: UBC4

12. ANS:



REF: AS LOC: UBC6, DS4

13. ANS:

Travelling equal distances in equal amounts of time.

REF: UC LOC: UBC3

14. ANS:

A car speeding up travels more distance per unit of time.

REF: UC LOC: UBC3

15. ANS:

The object is covering less and less distance per unit time.

REF: UC LOC: UBC3

16. ANS:

$v_1 = 10.00\ \text{km/h}$

$a_{av} = 1\,000.0\ \text{km/h}^2$

$\Delta t = 30.0\ \text{s} \times \frac{1\ \text{min}}{60\ \text{s}} \times \frac{1\ \text{h}}{60\ \text{min}} = 0.008\,33\ \text{h}$

$v_2 = ?$

$$\begin{aligned} v_2 &= v_1 + a_{av}\,\Delta t \\ &= 10.00\ \text{km/h} + 1\,000\ \text{km/h}^2 \times 0.008\,33\ \text{h} \\ &= 10.00\ \text{km/h} + 8.33\ \text{km/h} \\ &= 18.33\ \text{km/h} \end{aligned}$$

The final speed of the jet in 30.0 s would be 18.33 km/h.

REF: MC LOC: UBC7

17. ANS:

a. $v_1 = 4.0\text{ m/s}$

$v_2 = 15.0\text{ m/s}$

$\Delta t = 5.2\text{ s}$

$a_{av} = ?$

$$a_{av} = \frac{v_2 - v_1}{\Delta t}$$

$$= \frac{(15.0 - 4.0)\text{ m/s}}{5.2\text{ s}}$$

$$= 2.1\text{ m/s}^2$$

The average acceleration of the roller blader is 2.1 m/s^2.

b. An acceleration of 2.1 m/s^2 means that the speed of the roller blader is increasing at a rate of 2.1 m/s every second.

REF: UC LOC: UBC7

18. ANS:

$v_1 = 2.0\text{ m/s}$

$v_2 = 15.0\text{ m/s}$

$a_{av} = 4.3\text{ m/s}^2$

$\Delta t = ?$

$$\Delta t = \frac{v_2 - v_1}{a_{av}}$$

$$= \frac{(15.0 - 2.0)\text{ m/s}}{4.3\text{ m/s}^2}$$

$$= 3.0\text{ s (rounded to 2 significant digits)}$$

It took 3.0 s for the shark to accelerate from 2.0 m/s to 15.0 m/s.

REF: UC LOC: UBC7

19. ANS:

$v_1 = 4.0\text{ m/s}$

$a_{av} = 2.0\text{ m/s}^2$

$\Delta t = 3.0\text{ s}$

$v_2 = ?$

$$v_2 = v_1 + a_{av}\,\Delta t$$

$$= 4.0\text{ m/s} + 2.0\text{ m/s}^2 \times 3.0\text{ s}$$

$$= 4.0\text{ m/s} + 6.0\text{ m/s}$$

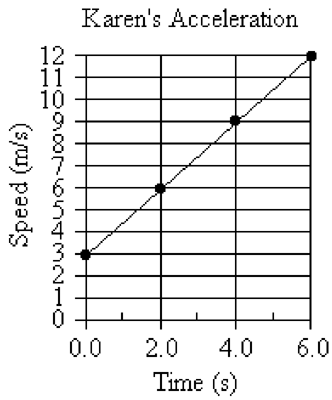
$$= 10\text{ m/s}$$

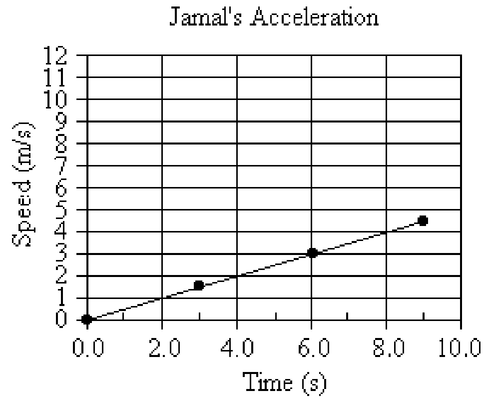
The final speed of the jet in 3.0 s would be 10 m/s.

REF: UC LOC: UBC7

20. ANS:

a.





b.

$v_1 = 9.0\ \text{m/s}$

$v_2 = 6.0\ \text{m/s}$

$\Delta t = (4.0 - 2.0)\text{s} = 2.0\text{s}$

$a_{av} = ?$

$$a_{av} = \frac{v_2 - v_1}{\Delta t}$$

$$= \frac{(9.0 - 6.0)\ \text{m/s}}{2.0s}$$

$= 1.5\ \text{m/s}^2$(rounded to 2 significant digits)

Karen's average acceleration is 1.5 m/s^2.

$v_1 = 1.5\ \text{m/s}$

$v_2 = 3.0\ \text{m/s}$

$\Delta t = (6.0 - 3.0)\ \text{s} = 3.0\ \text{s}$

$a_{av} = ?$

$$a_{av} = \frac{v_2 - v_1}{\Delta t}$$

$$= \frac{(3.0 - 1.5)\ \text{m/s}}{3.0\ \text{s}}$$

$= 0.5\ \text{m/s}^2$(rounded to 2 significant digits)

Jamal's average acceleration is 0.5 m/s^2.

Karen has the greater acceleration.

REF: UC LOC: UBC8

21. ANS:

If the line on a speed-time graph has a positive or negative slope, then it is accelerating.

REF: UC LOC: UBC8, DS4